U.S. DEPARTMENT OF COMMERCE
National Technical Information Service

PB-258 694

OCEAN DUMPING IN THE UNITED STATES-1975

THIRD ANNUAL REPORT OF THE ENVIRONMENTAL PROTECTION AGENCY ON ADMINISTRATION OF TITLE I OF THE MARINE PROTECTION, RESEARCH, AND SANCTUARIES ACT OF 1972, AS AMENDED

ENVIRONMENTAL PROTECTION AGENCY,
WASHINGTON, D.C.

JUNE 1975

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This is the third annual report of the Environmental Peotection Agency (EPA) to the Congress on the implementation of Title I of the Marine Protection, Research, and Sanctuaries Act of 1972, as amended, (referred to in this report as "the Act"). The Act became effective April 23, 1973, and since that time all ocean dumping of waste materials transported for the purpose of dumping has been done under permit from EPA except for dredged material, which is regulated by the Corps of Engineers. This annual report covers the second full year of regulation of ocean dumping by EPA under Title I of the Act, and it offers the first opportunity to make quantitative comparisons of how ocean dumping has changed since the Act became effective.

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Dumping,
Outfall sewers,
Municipalities,
Sludge disposal,
Surveys,
Sites,
Environmental impact statements,
Oceans,
Coasts,
Assessments,
Tables(data),
Barges,
Dredging,
Mercury(metal),
Cadmium.

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Third Annual Report of the Environmental Protection Agency on Administration of Title I

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SPRINGFIELD, VA. 22161

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Third Annual Report
of the
Environmental Protection Agency

on Administration
of Title I

Marine Protection, Research, and Sanctuaries

Act of 1972, as amended

JUNE 1975

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Water and Hazardous Materials
Washington, D. C. 20460

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JUL 30 1975

THE ADMINISTRATOR

Dear Mr. President:

The Marine Protection, Research, and Sanctuaries Act of 1972, as amended, requires an annual report from the Administrator of the Environmental Protection Agency on his administration of the ocean dumping permit program authorized under the Act. The third annual report for this program is transmitted with this letter.

The ocean dumping permit program became effective April 23, 1973; final regulations and criteria were published October 15, 1973. This report covers activities during fiscal year 1974.

Sincerely yours,

Russell E. Train

Honorable Nelson A. Rockefeller
President of the Senate
Washington, D.C. 20510

Enclosure

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JUL 30 1975

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Honorable Carl B. Albert
Speaker of the House
of Representatives
Washington, D.C. 20515

Enclosure

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I. INTRODUCTION AND SUMMARY

This is the third annual report of the Environmental Protection Agency (EPA) to the Congress on the implementation of Title I of the Marine Protection, Research, and Sanctuaries Act of 1972, as amended, (referred to in this report as "the Act"). The Act became effective April 23, 1973, and since that time all ocean dumping of waste materials transported for the purpose of dumping has been done under permit from EPA except for dredged material, which is regulated by the Corps of Engineers.

When the program was first initiated many procedural and technical decisions had to be made on an interim basis because of the need to implement the Act rapidly and the general lack of specific knowledge of the impact of ocean dumping on the marine environment. It was also apparent that the widespread practice of ocean dumping, which had been going on for many years, could not be stopped instantaneously without allowing time for the development of acceptable alternatives. During the two years since the Act became effective, the interim procedures and criteria have been replaced by improved regulations and criteria, better laboratory methods of analysis have been developed, a program of baseline surveys has been initiated, and many dumpers of toxic wastes have been phased out or are on firm implementation schedules.

This annual report covers the second full year of regulation of ocean dumping by EPA under Title I of the Act, and it offers the first opportunity to make quantitative comparisons of how ocean dumping has changed since the Act became effective.

Eleven ocean dumping sites in the Atlantic Ocean and the Gulf of Mexico are now in active use for municipal and industrial wastes. There is no dumping of these wastes in the Pacific, although municipal sewage sludge is discharged to the ocean through outfalls. These discharges are regulated under the permit system of the Federal Water Pollution Control Act Amendments of 1972. Ocean dumping site surveys are being conducted on three sites, and additional surveys are due to begin this year. These surveys are designed to provide the scientific data for Environmental Impact Statements (EIS) to be prepared for each dumping site designated on other than an interim basis and to determine as the basis for dumpsite management the effects of disposal in the oceans of a variety of wastes. Regulations for the designation and management of ocean dumping sites are being developed and will include the requirements for baseline and trend assessment surveys, and an interagency agreement concerning cooperative

efforts in such surveys has been developed with the National Oceanic and Atmospheric Administration (NOAA). A detailed baseline survey is currently being conducted in the New York Bight for an alternate site for sewage sludge disposal. EPA is also studying and evaluating two dump sites, one industrial and one municipal, off Delaware Bay, and is cooperating with NOAA in studies of a deepwater site off the continental shelf east of Cape Henlopen, Delaware. The Corps of Engineers has underway a five-year dredged material research program which will provide information to assist EPA in revising the dredged material criteria. In addition, results of the Corpssponsored studies will give EPA a better data base from which to evaluate dredged material disposal sites.

These studies are being supplemented by EPA research activities including conducting investigations into ecological processes and effects of ocean dumping.

Ocean dumping activity shows a net increase in ocean dumping of about 1.6 million tons from 1973 to 1974, excluding dredged material. This net increase is the result of an increase in dumping of construction and demolition debris of about 1.1 million tons combined with a slight overall increase in dumping of both industrial wastes and sewage sludge over the same period. However, during the coming year, EPA expects to phase out many industrial dumpers as alternate methods of disposal are developed and implemented. Based on existing permits and permit applications, there should be no dumping in the Pacific Ocean, and dumping in the Gulf of Mexico should be about 10 percent of the 1973 level.

All dumping of municipal sewage sludge originates in the New York and Philadelphia metropolitan areas, and the volume dumped increased slightly between 1973 and 1974. This was due to the increase in the volumes of sewage treated and the upgrading of some municipal sewage treatment plants.

Surveillance of dumping activities is assigned by the Act to the Coast Guard. The Coast Guard's enforcement program is keyed to close surveillance of the disposal of toxic materials with spot-checks of non-toxic material dumps.

All violations of permit conditions and illegal dumping reported to EPA are subject to enforcement action through the assessment of civil penalties, and, where necessary, criminal proceedings. From April, 1973 to December, 1974, there were 983 ocean disposal surveillance missions undertaken by the Coast Guard; 36 violation notifications were referred to EPA.

These were all investigated. Letters of warnings were issued and formal enforcement actions were taken.

The past year has seen the first use in the United States of a technique in ocean disposal commonly used in Europe for the past few years. This is ocean incineration, and it is useful for the disposal of toxic wastes with a high caloric value. Last October a specially designed incinerator ship capable of burning 4,200 tons of chemical wastes per mission, incinerated organochlorine wastes with greater than 99.9 percent efficiency at a site 143 nautical miles south of Galveston, Texas. These wastes are highly toxic and could not be dumped directly into the marine environment. Incineration converted these wastes to hydrogen chloride and carbon dioxide in quantities innocuous to the oceans and the atmosphere.

The major problem in the future is anticipated to be increased pressure to dispose of wastes in the ocean which result from more and better waste treatment facilities removing increased amounts of wastes from both municipal and industrial waste streams. The basic EPA approach has been to attempt to find and use the least environmentally damaging site and method of disposal for each waste whether it involves land, air, or water. Much additional study is needed on all disposal methods, including land disposal and incineration as well as ocean dumping, before the state of the art will be sufficient to allow the selection of the best environmental alternative in all cases.

II. PERMIT OPERATIONS

The Act absolutely prohibits the dumping of high-level radioactive wastes and all biological, chemical, and radiological warfare agents in the ocean. The dumping of all other wastes, except dredged material, is to be strictly regulated by EPA. The basis for regulation is given in the form of general criteria which require EPA to balance the following factors in coming to a determination whether to issue or deny a permit:

1. The need for the proposed dumping, as determined by EPA.

2. The effect of the dumping on the marine environment.

3. Social and economic considerations involving the dumping, including effects on health and welfare, fishery resources, recreational values, etc.

4. Alternate means of disposal, including alternate methods of treatment, land-based disposal, and recycling.

5. The feasibility of dumping beyond the continental shelf.

These same criteria apply to the issuance of permits under Sections 402 and 403 of the Federal Water Pollution Control Act Amendments of 1972 for outfall discharges into the ocean.

To carry out this responsibility, the Administrator of EPA is authorized to promulgate regulations, designate areas where ocean dumping may be permitted, and designate critical areas where dumping is prohibited. EPA must also give public notice and allow opportunity for public hearing before any permit is issued.

Dredged material may be dumped by the U. S. Army Corps of Engineers permittees after the proposed permit has been reviewed and agreed upon by EPA. In issuing such permits the Corps is required to use EPA-designated sites wherever feasible, but the Corps may use other sites if they determine that disposal at the EPA sites is not economically feasible and EPA grants a waiver. EPA must grant a waiver within 30 days unless it makes the determination that such disposal will have an unacceptable adverse effect on the environment.

Responsibility for surveillance of dumping operations to ensure that permit conditions are met is assigned to the U. S. Coast Guard. EPA, however, has the authority to assess civil penalities for

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violation of permit conditions. There is also a provision for criminal action.

Title II of the Act requires NOAA to conduct a comprehensive program of research and monitoring regarding the effects of the dumping of material into ocean waters. Title III gives to NOAA authority to establish marine sanctuaries.

Figures 1 and 2 show the procedures used by the EPA Regional offices in processing permit applications.

Section 220.3(d)(2) of the Ocean Dumping Final Regulations and Criteria specifies that an "interim permit will require the development and active implementation of a plan to either eliminate the discharge entirely from the ocean or to bring it within the limitations of..." the ocean dumping criteria. The expiration date of an interim permit is determined by completion of sequential phases of the development and implementation of the required plan and does not exceed one year from the date of issue. An interim permit may not be renewed, but a new interim permit may be issued upon satisfactory completion of each phase of the development and implementation of the plan.

A survey of the EPA Regional offices indicates that those previous permittees who have been required to phase out ocean dumping during 1974 have found many alternate methods of disposal, such as deep well injection, land incineration, landfill, storage, recycling, and industrial waste treatment, such as neutralization, biotreatment, and carbon adsorption.

Other permittees who are on current implementation plans are examining these and other alternatives to ocean disposal. In some cases the permittees have presented draft implementation plans to the Regional offices containing alternatives to ocean disposal not environmentally acceptable to EPA. These permittees have been requested to review again the alternatives available to them and report back to the region.

In July 1974, Region II initiated a comprehensive sludge management program for the New York-New Jersey metropolitan area designed to select environmentally acceptable alternatives for ultimate disposal of sewage sludge. The overall program considers three aspects of the problem: (1) state of the art of alternatives to ocean dumping of sewage sludge; (2) an in-depth study of a selected number of the most environmentally acceptable alternatives; and (3) recommendations for a legal-institutional sludge

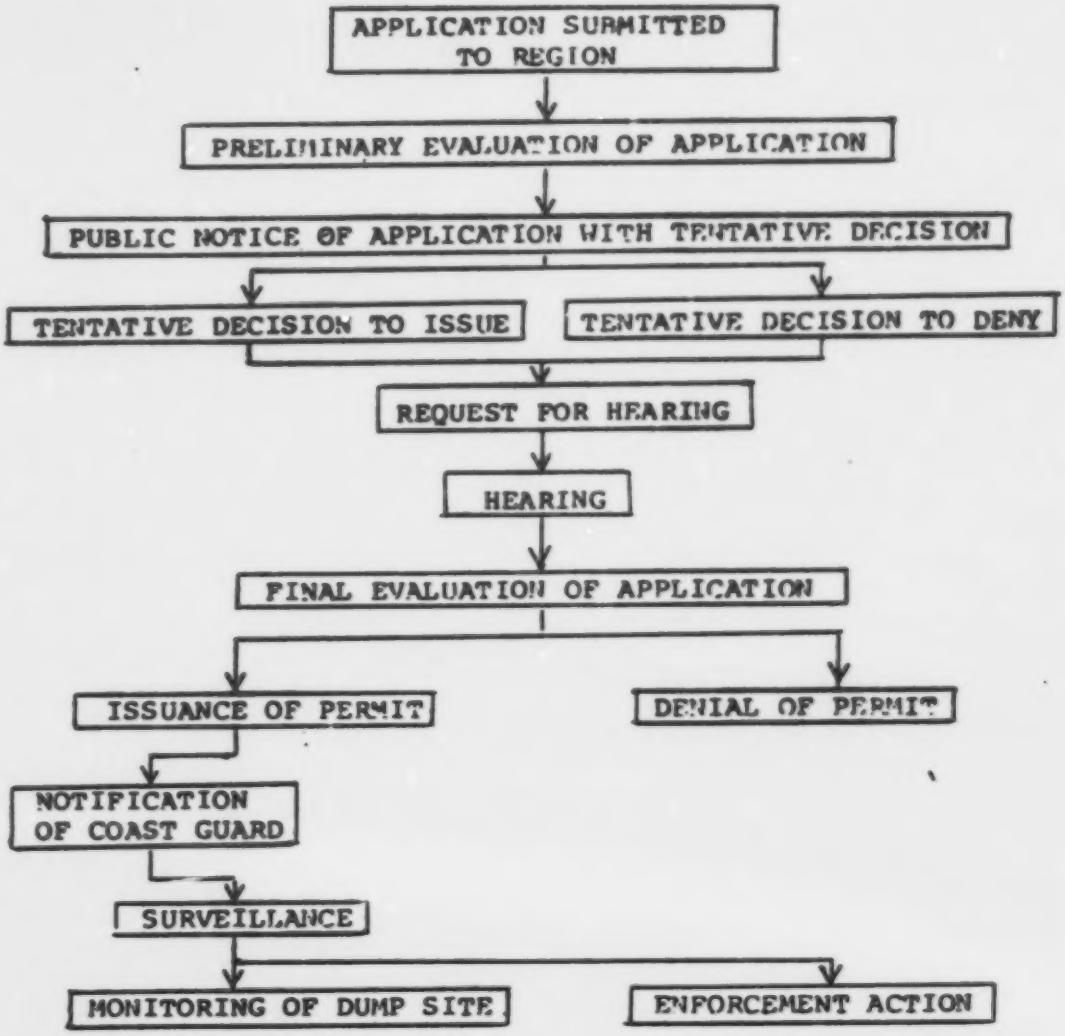

FIGURE 1. PERMIT PROCEDURES

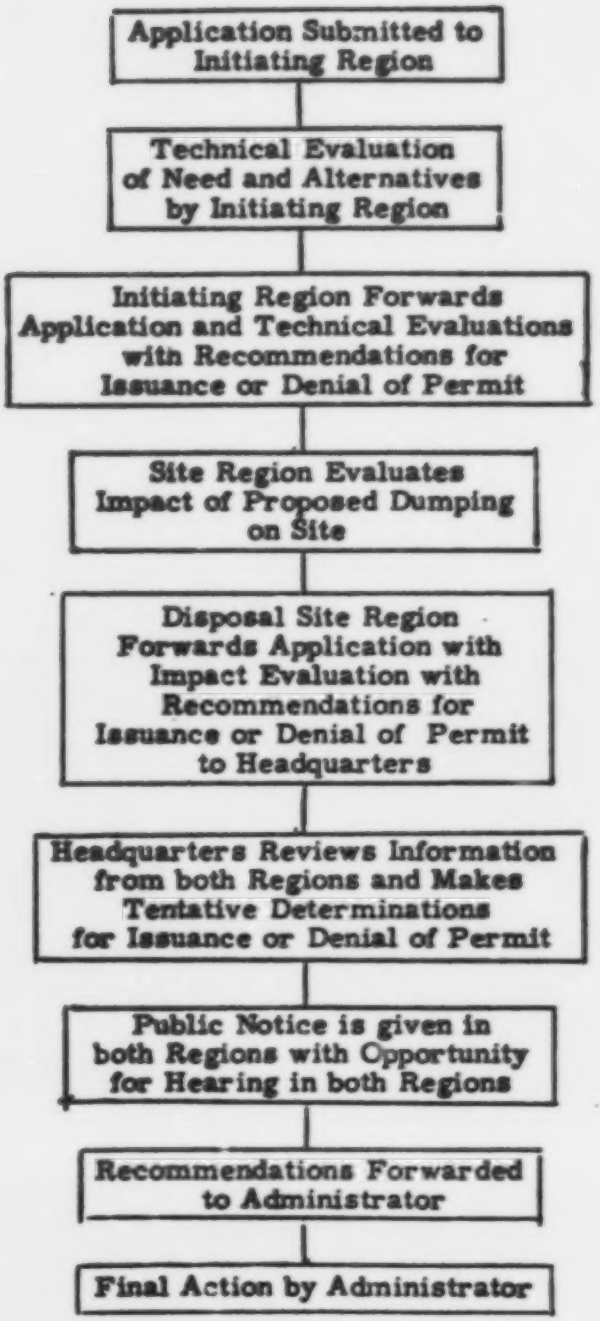
Application Submitted to Initiating Region
Technical Evaluation of Need and Alternatives by Initiating Region
Initiating Region Forwards Application and Technical Evaluations with Recommendations for Issuance or Denial of Permit
Site Region Evaluates Impact of Proposed Dumping on Site
Disposal Site Region Forwards Application with Impact Evaluation with Recommendations for Issuance or Denial of Permit to Headquarters
Headquarters Reviews Information from both Regions and Makes Tentative Determinations for Issuance or Denial of Permit
Public Notice is given in both Regions with Opportunity for Hearing in both Regions
Recommendations Forwarded to Administrator
Final Action by Administrator

FIGURE 2. INTER-REGIONAL PERMITS

management system. During 1974, preliminary investigations were completed on amounts and types of municipal wastes presently generated and projected future volumes. A general survey of major alternatives to ocean dumping of sewage sludge was also completed. This study has the support of all municipal sewage sludge authorities in the area and will be continued with a target date for completion and final report in late 1975.

Region III, in issuing an interim permit to the City of Philadelphia in February of 1974, required them to identify sources of heavy metals to determine whether they should be required to eliminate ocean dumping entirely or whether the sewage sludge could be brought within the limitations of the criteria. The interim permit issued to Philadelphia in February of 1975 is currently under review by the EPA Administrator.

Table 1 lists by Regional offices those permits in force during 1974, the type of permit, the material dumped, the date the most current 1974 permit was issued and expires, and the maximum quantity of waste allowed to be dumped under the permit.

Table 2 lists by EPA Regions those permits denied and dumpers phased out during 1974. It should be pointed out that prospective applicants are often encouraged by Regional personnel to seek alternatives to ocean disposal; these companies do not appear on the "Permits Denied" list since they have not actually filed an application or gone through the steps prior to issuance or denial of a permit.

Title I of the Act provides that the Coast Guard shall conduct surveillance and other appropriate enforcement activity to prevent unlawful transportation of material for dumping, or unlawful dumping.

The Coast Guard's enforcement program is keyed to close surveillance of the disposal of industrial waste materials and spot checks of sewage sludge and dredged material disposal. Surveillance methods include escorting or interception of dumping vessels at the dump site by vessels or aircraft, spot checks of ships' logs, and the use of ship-riders to ascertain position and dumping rate. From the inception of the program in April, 1973 to December, 1974, there were 983 ocean disposal surveillance missions; 36 violation notifications have been referred to EPA encompassing 154 apparent violations. Table 3 summarizes these violations. The large number of violations in the category of dumpers' failure to notify the Captain of the Port (COTP) is apparently due to a problem of communications and bookkeeping involving the

TABLE 1
PERMITS IN FORCE DURING CALENDAR YEAR 1974

Applicant/Type Permit	Material Dumped	Date Issued	Date Expired	Max. quant. Allowed Under Permit
Region I				
Safety Projects & Eng. special	misc. lab reagents	11/20/73	11/15/74	5,500 gal.
Pine State By-Products special	wash-down water	4/04/74	1/13/75	180,000 gal.
McKie Co. emergency	scrap ferrous metal trimgs.	4/22/74	5/20/74	3,500 T
Region II				
Middletown Sewerage Auth. interim	sewage sludge	4/15/74	4/14/75	4,276 c.y.
Passaic Valley Sew. Auth. interim	"	"	"	672,222 c.y.
Middlesex Co. Sew. Auth. interim	"	"	"	422,805 c.y.
Modern Transp. Co. interim	"	"	"	471,111 c.y.
Bergen Co. Sew. Auth. interim	"	"	"	294,000 c.y.
Linden Roselle Sew. Auth. interim	"	"	"	240,288 c.y.
Joint Meeting of Essex & Union Counties interim	"	"	"	160,333 c.y.
Borough of Fairfield interim	"	"	"	4,741 c.y.
City of Long Beach interim	"	"	"	15,012 c.y.

TABLE 1 (CONT'D)

PERMITS IN FORCE DURING CALENDAR YEAR 1974

Applicant/Type Permit	Material Dumped	Date Issued	Date Expired	Max. Quant. Allowed Under Permit
County of Nassau interim	sewage sludge	4/15/74	4/14/75	672,600 c.y.
County of Westchester interim	"	"	"	95,250 c.y.
West Long Beach Sew. Dist. interim	"	"	"	1,852 c.y.
City of NY-Wards Island Pl. interim	"	"	"	455,779 c.y.
City of NY-Hunts Point Pl. interim	"	"	"	309,247 c.y.
City of NY-26th Ward Pl. interim	"	"	"	321,363 c.y.
City of NY-Coney Isl. Pl. interim	"	"	"	247,117 c.y.
City of NY-Owls Head Pl. interim	"	"	"	427,561 c.y.
City of NY-Newton Creek Pl. interim	"	"	"	1,181,064 c.y.
City of NY-Tallman Isl. Pl. interim	"	"	"	92,530 c.y.
City of NY-Bowery Bay Pl. interim	"	"	"	481,402 c.y.
City of NY-Rockaway Pl. interim	"	"	"	55,112 c.y.
City of NY-Port Richmond Pl. interim	"	"	"	66,304 c.y.
City of NY-Jamaica Pl. interim	"	"	"	365,965 c.y.

TABLE 1 (CONT'D)

PERMITS IN FORCE DURING CALENDAR YEAR 1974

Applicant/Type Permit	Material Dumped	Date Issued	Date Expired	Max. quant. Allowed Under Permit
City of Glen Cove interim	sewage sludge	4/15/74	4/14/75	15,000 c.y.
Whippany Paper Board Co. interim	waste activated sludge	7/15/74	7/14/75	91,250 c.y.
Wm. Schaefer Septic interim	sewage sludge & septic tank wastes	"	"	10,400 c.y.
Caldwell Trucking Co. interim	sewage sludge & septic tank wastes	"	"	41,500 c.y.
American Cyanimid (Ag. Div.) interim	waste activated sludge	"	"	1,300 c.y.
Modern Transp. Co. interim	digester cleanout	9/1/74	8/31/75	13,200,000 gal.
S. B. Thomas, Inc. interim	bakery waste sludge	"	"	1,082,250 gal.
A&S Transp. Co. interim	digester cleanout	9/01/74	12/31/74	1,000,000 gal.
American Cyanimid interim	chem. wastes	7/15/74	7/14/75	36,500,000 gal.
Allied Chemical interim	by-product hydrochloric acid	10/31/74	7/14/75	26,133,000 gal.
Upjohn Mfg. Co. interim	pharmaceutical wastes	9/15/74	9/14/75	27,375,000 gal.
DuPont-Grasselli interim	ind. wastes	10/31/74	7/14/75	185,000,000 gal.

TABLE 1 (CONT'D)
PERMITS IN FORCE DURING CALENDAR YEAR 1974

Applicant/Type Permit	Material Dumped	Date Issued	Date Expired	Max. Quant. Allowed Under Permit
Merck & Co. interim	pharmaceutical wastes	7/15/74	7/14/75	5,100,000 gal.
Chevron Oil Co. interim	refinery wastes	"	"	10,950,000 gal.
Abbott Chemicals interim	pharmaceutical wastes	9/15/74	9/14/75	1,440,000 gal.
NL Industries interim	spent sulfate sol.; inert ore slurry	10/31/74	7/14/75	675,000,000 gal.
Moran Towing Corp. special	cellar dirt construction rubble	5/15/74	5/14/75	14,580,000 c. ft.
Pfizer Pharmaceuticals interim	pharmaceutical wastes	9/15/74	9/14/75	2,500,000 gal.
Merck, Sharp & Dohme interim	pharmaceutical wastes	"	"	25,583,000 gal.
Amerada Hess Corp. interim	spent caustic	7/15/74	7/14/75	3,239,100 gal.
Oxochem Enterprise interim	oxo-alcohol wastes	9/15/74	9/14/75	26,334,000 gal.
Puerto Rico Olefins interim	petroleum processing wastes	"	"	2,412,000 gal.
Sherwin Williams Co. interim	paint mgf. wastes	7/15/74	7/14/75	28,000 gal.
Sobin Chemicals Inc. interim	salicylaldehyde mfg. wastes	7/15/74	7/14/75	2,000,000 gal.

TABLE 1 (CON'T'D)

PERMITS IN FORCE DURING CALENDAR YEAR 1974

Applicant/Type Permit	Material Dumped	Date Issued	Date Expired	Max. quant. Allowed Under Permit
International Wire Prod. interim	sludge from wire drawing & plating proc.	7/15/74	7/14/75	120,000 gal.
Water Tunnel Contractors special	blasted tunnel rock	5/15/74	5/14/75	380,000 T
Mycalex Corp. interim	water slurry of inert glass	7/15/74	5/31/75	1,000,000 gal.
Arrow Group Industries interim	sludge from galvanizing & plating operations	7/15/74	7/14/75	2,400,000 gal.
Howmet Corp. interim	liquid waste from mfg. of micro-castings	"	"	120,000 gal.
Worthington Biochemical interim	enzyme extraction & fermentation wastes	"	5/31/75	9,300,000 gal.
Reheis Chem. Co. interim	pharmaceutical wastes	10/31/74	7/14/75	5,800,000 gal.
Bristol Alpha Corp. interim	pharmaceutical wastes	9/15/74	9/14/75	1,092,000 gal.
M/M Mars interim	cleaning wastes	7/15/74	7/14/75	673,400 gal.
Coca-Cola Co. interim	beverage mfg. wastes	7/15/74	7/14/75	10,800,000 gal.
Curtiss-Wright Corp. interim	rinsing waste from aircraft components mfg.	"	"	216,000 gal.

TABLE 1 (CONT'D)

PERMITS IN FORCE DURING CALENDAR YEAR 1974

Applicant/Type Permit	Material Dumped	Date Issued	Date Expired	Max. quant. Allowed Under Permit
Eagle Extrusion Corp. interim	rinse water sludge from cleaning painted alum. extrusions	7/15/74	7/14/75	96,000 gal.
Gaess Env. Svc. Corp. interim	pharmaceuticals & org. chemicals	7/15/74	11/01/74	10,000,000 gal.
Norda, Inc. interim	flavor & fragrance mfg. wastes	7/15/74	7/14/75	1,200,000 gal.
S. B. Penick & Co. interim	plant extracts wastes	"	"	2,010,000 gal.
Solvents Recovery Svc. interim	used organic mat'l recycling wastes	"	"	660,000 gal.
Tenco Div. of Coca Cola interim	food mfg. wastes	"	"	250,000 gal.
Nestle Company interim	food mfg. wastes	"	"	5,460,000 gal.
U. S. Radium Corp. interim	non-radioactive waste from mfg. luminescent chem.	7/15/74	5/31/75	6,000,000 gal.
Warner Lambert Co. interim	pharm. waste & san. sewage sludge	7/15/74	5/31/75	150,000 gal.

TABLE 1 (CONT'D)

PERMITS IN FORCE DURING CALENDAR YEAR 1974

Applicant/Type Permit	Material Dumped	Date Issued	Date Expired	Max. quant. Allowed Under Permit
Blue Ridge - Winkler Text. interim	waste activated & alum sludge	7/15/74	7/14/75	1,800,000 gal.
Pfizer, Inc. interim	cosmetics mfg. wastes	7/15/74	7/14/75	1,800,000 gal.
J.T. Baker Chem. Co. interim	manganous carbonate prod. wastes	"	"	1,500,000 gal.
Fritzsche Dodge & Olcott interim	org. flavoring chem. wastes	"	"	420,000 gal.
Evor Phillips Leasing Co. interim	waste reclamation treatment residues	"	"	25,000,000 gal.
Riegel Products Corp. interim	resin-impregnated paper prod. wastes	"	"	520,000 gal.
Keuffel & Esser Co. interim	residual coating sol. from mfg. reprod. paper	"	"	1,300,000 gal.
Schering Corp. interim	neut. pharm. wastes	9/15/74	9/14/75	11,000,000 gal.
Bell Telephone Labs.	etching, plating & photo process wastes	7/15/74	8/31/74	245,000 gal.

TABLE 1 (CONT'D)

PERMITS IN FORCE DURING CALENDAR YEAR 1974

Applicant/Type Permit	Material Dumped	Date Issued	Date Expired	Max. quant. Allowed Under Permit
Region III				
City of Camden interim	digested sewage sludge	8/21/74	8/21/75	15,000,000 gal.
Rollins Env. Services special	ind. wastes	9/16/74	12/16/74	1,800,000 gal.
DuPont - Edge Moor interim	titanium dioxide wastes	11/11/74	11/10/75	125,000,000 gal.
Crompton & Knowles special	dye wastes	9/13/74	12/13/74	1,750,000 gal.
City of Philadelphia interim	sewage sludge	2/13/74	2/13/75	150,000,000 gal.
Modern Transp. (municipal) special	sewage, septic &digester sludge	4/04/74	4/04/75	15,600,000 gal.
Modern Transp. (industrial) special	ind. wastes	4/04/74	4/04/75	2,000,000 gal.
Sun Oil Co. interim	spent caustic	7/15/74	7/15/75	7,980,000 gal.
Region VI				
Shell Chemical Co. interim	spent caustic & digested biol. sludge	2/13/74	2/13/75	66,000 T
Ethyl Corp. interim	sodium-calcium sludge	"	"	8,000 drums
DuPont - Beaumont interim	chemical mfg. wastes	"	"	307,000 T
DuPont - LaPorte interim	chemical mfg. wastes	"	1/01/75	268,000 T

TABLE 1 (CONT'D)

PERMITS IN FORCE DURING CALENDAR YEAR 1974

Applicant/Type Permit	Material Dumped	Date Issued	Date Expired	Max. quant. Allowed Under Permit
GAF Corp. interim	chemical mfg. wastes	4/15/74	12/31/74	153,000 T
DuPont - Belle interim	chemical mfg. wastes	5/01/73	4/15/74	7,500 T/mo.
Region IX				
H-10 Water Taxi Co. special	wet garbage & dry trash	2/14/74	2/13/75	200 T
U.S. Army Corps of Engs. emergency	MV Caribia	12/26/74	12/26/75	26,000 T
Headquarters				
Shell Chemical Co. research	organo-chlorine wastes	10/10/74	10/26/74	4,200 metric tons
Shell Chemical Co. research	organo-chlorine wastes	11/28/74	12/16/74	4,200 metric tons
Shell Chemical Co. interim	organo-chlorine wastes	12/12/74	1/20/75	8,400 metric tons

TABLE 2

Permits Denied and Dumpers Phased Out During 1974

Applicant	Remarks
Region II	
Consolidated Edison	denied
Gaess Environmental Services	phased out
Bell Telephone Laboratories	phased out
Amerada Hess	plant closed
Riegel Products	phased out
Ansul Company	withdrew application
BASF Wyandotte Corporation	denied
Clorox Company	denied
Region III	
Rollins Environmental Services	plant closed
Region IV	
GAF	phased out
DuPont - Belle	denied by the Administrator
DuPont-LaPorte	phased out
Shell Chemical Company (spent caustic portion of waste)	phased out

TABLE 3

Ocean Dumping violations Referred to EPA
April 1973 - December 1974

VIOLATION	CG DISTRICT	# VIOLATIONS
Dumping short	3	3
	7	2
	12	1
Dumping long	7	1
Dumping without permit	HQ	1
	1	1
Attempted dumping without permit	1	1
Violating permit conditions*	1	2
	3	1
	7	1
	11	4
Failure to notify COTP	3	113
Liquid wastes spilled enroute	3	2
No Permit on board	3	1
		154 Total

*(dumping at night, trash/garbage blowing overboard enroute, not sinking on site, etc.)

dumpers, the Coast Guard, and EPA. Steps have been taken to develop improvements in procedures for notification to the COTP of departure and arrival times.

The ocean dumping surveillance and enforcement program has prompted the development of advanced hardware and techniques. Coast Guard Research and Development is working on a sealed recording navigation system to be carried aboard dumping vessels which should help to provide more efficient enforcement with existing resources. It should also aid the vessel's master in his navigation.

In several instances the Coast Guard has provided to EPA both photographic and sworn visual observation evidence of cases of violation. In one case where evidence of two short dumps was presented, the violator was assessed a penalty of $40,000 and required to install additonal navigational equipment to insure that further premature dumps would not occur.

Another case of alleged short dumping supported by photographic evidence provided by the Coast Guard was dismissed by EPA as a result of additional photographic evidence provided by the alleged violator. What appeared to be sludge discharging from a barge was, in the opinion of the Regional Enforcement Division, the resulting action of self-propelled vessels in shallow water. Rather than waste being discharged, it was bottom material being disturbed as the result of certain maneuvers in shallow water. The Coast Guard then agreed with these findings and the charges contained in the Notice of Violation were formally withdrawn.

In another instance, two Coast Guard helicopter pilots presented visual observation testimony of a short dump. A penalty of $25,000 has been assessed against the violator. Two other cases of violations, one supported by Coast Guard evidentiary material, have resulted in fines being levied and, in one case, the permit has not been renewed and the dumping has been terminated.

III. ANALYSIS OF EXISTING DUMPING ACTIVITY

During the two years that the Act has been in effect all previous unregulated dumping of wastes into ocean waters has come under strict regulation by the Ocean Dumping Permit Program. The level of dumping activity that has occurred under EPA permits since the program became operational is indicated in Table 4.

The absence of complete and accurate dumping records prior to the implementation of the permit program makes any comparison with ocean dumping activity of past years difficult. It is evident, however, that ocean dumping of wastes was increasing when the Act was passed. In addition, both the Senate and House versions of this Bill reflected the concern that those pollutants, which were previously discharged into the Nation's waters or air and are now restricted by the Federal Water Pollution Control Act Amendments of 1972 and the Clean Air Act, not end up indiscriminately being dumped in the ocean.

The data in Table 4 show an increase from 1973 to 1974 in the dumping of industrial wastes, sewage sludge, and construction debris, with no dumping of explosives and fairly insignificant dumping of solid waste (in this case, garbage from foreign vessels which is prohibited by law for health reasons from being brought to shore). The permit program went into effect in mid-1973, so the data for that year reflect eight months of dumping activity extrapolated for 12 months to estimate an annual rate.

In implementing the ocean dumping permit program, EPA requires a thorough evaluation in all applications of the need for ocean dumping and the availability of alternate methods of disposal. This approach has required a number of industrial dumpers to seek other alternatives. The two years from 1973 through 1974 represent, in most cases, the time that it has taken industrial dumpers to pursue other alternatives and build treatment plants or implement other methods of waste disposal.

On the Atlantic coast alone, 47 former dumpers ceased ocean dumping either by the time the Act went into effect or after having initially received permits. Another nine companies have either withdrawn their applications or have been denied permits. At least 14 current dumpers are scheduled to cease ocean dumping in June, 1975, and eight more in June, 1976. The increase in amount of industrial wastes dumped in the Atlantic does not represent new dumpers, but rather the industrial growth during which time the companies have been seeking alternatives to ocean dumping. In fact, the amount of wastes dumped into the Gulf of Mexico decreased measurably because four out of the seven original permittees had implemented alternatives to ocean dumping by the end of 1974.

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TABLE 4

OCEAN DISPOSAL: TYPES AND AMOUNTS, 1974* and 1973**
(IN TONS, APPROX.)

WASTE TYPE	ATLANTIC		GULF		PACIFIC		TOTAL	
	1974	1973	1974	1973	1974	1973	1974	1973
Industrial Waste	4,767,000	3,997,100	950,000	1,408,000	0	0	5,717,000	5,405,100
Sewage Sludge	5,676,000	5,429,400	0	0	0	0	5,676,000	5,429,400
Construction & Demolition Debris	2,242,000	1,161,000	0	0	0	0	2,242,000	1,161,000
Solid Waste	0	0	0	0	200	240	200	240
Explosives	0	0	0	0	0	0	0	0
TOTAL	12,685,000	10,587,500	950,000	1,408,000	200	240	13,635,200	11,995,740

* 1974 Source - EPA Regional Offices. Unpublished Reports, updated information, 1974 (12 months of dumping activity).

** 1973 Source - EPA Regional Offices. Unpublished Reports, 1973 (8 months of dumping activity--May to December 1973 under permits issued by Ocean Disposal Program extrapolated for 12 months to provide an annual rate).

The increase in the amount of sewage sludge being ocean dumped off the Atlantic coast is due to increased plant capacity and additional levels of treatment of municipal waste, not to an increased number of municipal dumpers. About five million cubic yards of municipal sludge were dumped in the New York Bight in 1974. Upgrading present treatment facilities to secondary level (90% reduction of BOD and suspended solids), plus treatment of the present raw sewage discharges, will significantly increase the volume of sludge to be handled. Unless environmentally acceptable alternate sludge disposal methods are developed this additional sludge will be dumped in the ocean.

The increase in construction rubble is due primarily to the current work on the Harlem River water supply tunnel. The construction debris from this project is being transported to the cellar dirt site and ocean dumped.

As indicated in Table 4 ocean dumping of barged wastes is currently utilized as a disposal technique predominately on the East and Gulf Coasts for industrial wastes and on the East Coast alone for sewage sludge. This is not merely because these areas have failed to fully pursue alternatives to ocean disposal, but rather a combined result of historical usage of ocean dumping and immediate unavailability of alternate methods of disposal.

The use of ocean outfall pipes and the availability of land for disposal on the West Coast have made unnecessary the barging of wastes to the ocean. Inland disposal of municipal effluents and sludges in the Gulf Coast states has prevented the development of ocean dumping of municipal wastes into the Gulf of Mexico. On the other hand, it has been those areas open to the sea with a high density of population and industrial development such as metropolitan New York and Philadelphia that have turned to ocean dumping. Now these industrial and municipal dumpers are being required to evaluate the alternatives to ocean disposal.

Based on the concentrations of specific constituents analyzed to be in wastes dumped in the ocean, the annual input of these constituents from ocean dumping can be determined. Some calculations have been made for the amount of mercury and cadmium dumped off the Altantic Coast as "trace contaminants" in wastes (Table 5).

TABLE 5

Arnual Inputs of Mercury and Cadmium Due to Ocean Dumping Off The Atlantic Coast

	1974		1973	
	Mercury lbs.	Cadmium lbs.	Mercury lbs.	Cadmium lbs.
Region II				
Industrial	17	69	145	2,998
Region II				
Municipal	3,532	34,817	5,998	33,173
Region III				
Industrial	*	744	*	*
Region III				
Municipal	*	13,640	*	*

*Data not available

In Region II, 99.5 percent of the mercury and 99.8 percent of the cadmium dumped in the ocean comes from the municipal sewage sludge, with only 0.5 percent of the mercury and 0.2 percent of the cadmium from industrial wastes. A similar situation is noted for Region III where the mass loading of cadmium from municipal wastes is 94.8 percent of the total cadmium while dumping of waste acid accounts for 5.2 percent of the total cadmium.

EPA permits authorize the use of 33 barges in ocean dumping operations. These are listed in Table 6. Six of the barges are self-propelled ocean-going vessles; the remainder are not self-propelled and require the services of a tugboat.

During 1974, about 1,900 barging trips were made to dump wastes at the 11 disposal sites at which dumping is permitted by EPA (See Table 7).

The cost to the permittee of ocean dumping as a disposal technique varies with the type of waste, the distance to the dumpsite, and permit requirements. A general estimate can be made of dumping costs by waste categories:

Mixed Industrial Wastes	$12-$14/cubic yard
Acid Wastes	$ 2-$ 6/cubic yard
Sewage Sludge	$ 2-$ 6/cubic yard

TABLE 6

Barges Authorized for Ocean Dumping
by EPA Permits Under The Marine Protection, Research,
and Sanctuaries Act of 1972, as Amended

Barge	Permitted Transporter(s)	Permitted Departure Point(s)	Permitted Waste Type
Region I			
Mary M	Safety Projects & Eng.	Hingham, MA	indust.
Carolinian	Pine State By-Products	Portland, ME	indust.
Region II			
Newtown Creek	City of NY-EPA	N.Y., NY	sludge
Coney Island	City of NY-EPA	N.Y., NY	sludge
Owls Head	City of NY-EPA	N.Y., NY	sludge
Bowery Bay	City of NY-EPA	N.Y., NY	sludge
Ocean Disposal #1	A&S Trans. Co. A&S Trans. Co. and Weeks Dredg. & Contract. Modern Trans. Co.	So. Kearny, NJ Arecibo, PR	indust. sludge
Liquid Waste #1	A&S Trans. Co. PCI Internat'l Inc. Modern Trans. Co.	So. Kearny, NJ Arecibo, PR	indust. pharma.
Sparkling Waters	Spentonbush Trans. Service	N.Y., NY	indust.
Susan Frank	General Marine Trans. Co. General Marine Trans. Co. & Ocean Disposal Co.	Bayonne, NJ	sludge
AC5	Allied Chemical Corp.	Morristown, NJ	acid

TABLE 6 (CON'T)

Barge	Permitted Transporter(s)	Permitted Departure Point(s)	Permitted Waste Type
Moran 108	Moran Towing and Trans., Inc.	N.Y., NY	acid
Moran 102	Moran Towing and Trans., Inc.	N.Y.. NY	acid
Westco 1	McAllister Bros.	N.Y., NY	sludge
Region II & III Forest	Spentonbush Trans. Service	N.Y., NY	indust.
	A&S Trans. Co.	So. Kearny, NJ	sludge
	Modern Trans. Co.	Camden, NJ Philadelphia, PA	
Lisa	Spentonbush Trans. Service	N.Y., NY	indust.
	A&S Trans. Co.	So. Kearny, NJ	sludge
	Modern Trans. Co.	Camden, NJ Philadelphia, PA	
J.K. Stickle	Spentonbush Trans. Service	N.Y., NY	indust.
	A&S Trans. Co.	So. Kearny, NJ	sludge
	A&S Trans. Co. and Weeks Dredg. & Contract.	Camden, NJ Philadelphia, PA Elizabeth, NJ	pharma.
	Modern Trans. Co.	Arecibo, PR	
Raritan	Spentonbush Trans. Service	N.Y., NY	indust.
	A&S Trans. Co.	So. Kearny, NJ	sludge
	A&S Trans. Co. and Weeks Dredg. & Contract.	Camden, NJ	
	Modern Trans. Co.	Philadelphia, PA	
Region III Edge Moor I	E.I. du Pont de Nemours	Edge Moor, DE	acid
SS Western Sun	Sun Trans. Co.	Marcus Hook, PA	spent caustic
#48	Interstate Ocean Disposal Trans. Co.	Marcus Hook, PA	spent caustic

TABLE 6 (CON'T)

Barge	Permitted Transporter(s)	Permitted Departure Point(s)	Permitted Waste Type
Region VI			
PATCO-100	Port Arthur Towing Co.	Beaumont, TX LaPorte, TX	indust.
Triton	Port Arthur Towing Co.	Beaumont, TX LaPorte, TX Texas City, TX	indust.
H.L. Jacobs	DuPont Lessee	Beaumont, TX LaPorte, TX	indust.
Z-110	Domar Ocean Trans. Ltd.	Beaumont, TX LaPorte, TX	indust.
Z-120	Domar Ocean Trans. Ltd.	Beaumont, TX LaPorte, TX	indust.
Z-122	Domar Ocean Trans. Ltd.	Beaumont, TX LaPorte, TX	indust.
2502	Domar Ocean Trans. Ltd.	Beaumont, TX LaPorte, TX	indust.
Z-111	Domar Ocean Trans. Ltd.	LaPorte, TX	indust.
GAF #1	Port Arthur Towing Co.	Texas City, TX	indust.
Chem 810	Dixie Carriers Inc.	Deer Park, TX	indust.
Offshore No. 2405	Dixie Carriers Inc.	Deer Park, TX	indust.
Magnolia I	Lockport Chemical Co. (Chem. Waste Disposal Co.)	Baton Rouge, LA	indust.
Region IX			
M/V Ramona	H-10 Water Taxi Co., Ltd.	Los Angeles, CA Long Beach, CA	garbage
H-10 Disposal Barge I	H-10 Water Taxi Co., Ltd.	Los Angeles, CA Long Beach, CA	garbage

TABLE 7

Barge Trips for Ocean Dumping

	Dump Site	Number of Trips
Region I		
	Mixed Industrial Waste	1
	Other	4
	Total	5
Region II		
	Mixed Industrial Waste	196
	Acid Waste	792
	Sewage Sludge	400
	Other	*
	Total	1,388
Region III		
	Mixed Industrial Waste	*
	Acid Waste	125
	Sewage Sludge	97
	Total	222
Region VI		
	Mixed Industrial Waste	219
	Ocean Incineration	4
	Total	223
Region IX		
	Garbage	16
	Total number of ocean dumping trips	1854

*Data not available

IV. BASELINE SURVEY PROGRAM

Section 102(c) of the Act authorizes the Administrator to designate recommended sites or times for dumping, considering the criteria of Section 102(a). When the interim regulations were published, a list of interim dump sites was included. These sites were selected from existing information on ocean dumping and were selected based on historical usage, not on environmental criteria governing the selection of sites to minimize damage to the marine environment. This was recognized as a temporary expedient, and EPA has since made the commitment that it will comply with the requirements of the National Environmental Policy Act in the designation of ocean dumping sites for continuing use.

Regulations are now being developed to establish the procedures by which ocean dumping sites will be designated for continuing use; these procedures will include the preparation of an Environmental Impact Statement (EIS) for virtually all ocean dumpsites presently in use or proposed for use.

The preparation of an acceptable EIS on an ocean dumping site requires the collection of a large amount of environmental data at the site itself and in nearby areas to form the basis for an environmental assessment of the site and to predict the impact of dumping on the site. The data collection requirements needed for an environmental assessment of a dump site have been formalized into a standard baseline survey guideline.

This baseline survey guideline was developed in consultation with NOAA and serves as the basic plan for all baseline surveys, with appropriate modifications being made to meet special situations. The basic plan in any baseline survey is to take samples of both water and sediments to determine the levels of specific chemical parameters in and near the dumpsite. Of particular interest are trace metals and persistent organic compounds that might be present in wastes dumped at the site. Samples are also taken of living organisms at and near the site in the water column, at the bottom, and in the sediments. This broad scale sampling is needed to provide data on the widest possible range of ecological features at the dump site so that an accurate assessment can be made of what the impact of pollutants would be at the dumpsite.

Before any acceptable appraisal of conditions at a dumpsite is possible, the full range of seasonal or other periodic variations in conditions must be observed. The baseline survey program was begun during FY 1974, and during FY 1975, additional studies

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have begun. A brief synopsis of each baseline survey presently being conducted follows.

1. Alternate Sewage Sludge Dumpsite in the New York Bight

Sewage sludge from the New York metropolitan area is currently being dumped at a site approximately twelve miles from recreational beaches. While no impact on the beaches has yet been seen from sludge dumped at this site, increased sewage treatment in the New York metropolitan area will result in much greater volumes of sludge to be disposed of during the next few years. Much of this sludge may have to be ocean dumped as an interim measure until a permanent form of ultimate disposal is selected and implemented.

In early 1974, EPA requested NOAA to recommend areas farther out in the New York Bight for study as alternate sludge dumping sites. NOAA recommended two areas, one just north of the Hudson Canyon and the other just to the south of the Hudson Canyon; EPA has begun studies, by contract, of the area recommended by NOAA just north of the Hudson Canyon and about 60 miles from Ambrose Light. The contract calls for three surveys approximately three months apart depending on weather conditions. The first survey was conducted during September and October, 1974; the second was conducted during January and February, 1975; and the third survey is scheduled for July and August 1975.

The study area, one of those recommended by NOAA, is 144 square miles and data have been collected at 15 biological stations, five chemical stations, and three current measurement stations. The study area is fairly typical of an open continental shelf environment with a fairly flat and featureless bottom and a diverse biological community. Seasonal differences between the first two surveys were observed, particularly in number and variety of organisms present in the water column. From this site, where no ocean dumping is now occurring, small quantities of slag were recovered in some samples and small plastic spheres were recovered from surface tows. Neither of these materials is typical of sewage sludge.

In addition to providing the required data for an Environmental Impact Statement, a major output of this study will be the development of a monitoring program for the alternate sludge disposal site.

2. Philadelphia and DuPont Dumpsites off Delaware Bay.

Prior to the beginning of the Ocean Dumping Permit Program, Philadelphia had been dumping sewage sludge at a location approximately 11 miles seaward of the mouth of Delaware Bay. In April, 1973, EPA issued an interim ocean dumping permit to Philadelphia for ocean disposal of sewage sludge, but required the city to use a site about 50 nautical miles southeast of the mouth of the Delaware Bay. Philadelphia has used this designated site up to the present time. This site is quite close to the site being used by DuPont for the disposal of waste acid.

Prior to use of the present site by Philadelphia, a single baseline survey of the site was conducted, and since then surveys have been made on a quarterly basis. These surveys have been a cooperative effort among EPA, universities, industries, and NOAA. About 20-24 stations are sampled on each survey, primarily for trace metals in sediments and in organisms. Direct observations were also made in August, 1974, using a manned submersible.

The close proximity of these two dumpsites makes it logistically economical to study them both at the same time. The difference in composition between the two wastes makes it possible to use different constituents as tracers to describe the movement of each waste. Using this technique statistically significant differences in the geographical distribution of trace metals in sediments and in some organisms have been found. Additional studies are being conducted to quantify the nature and extent of these differences and to establish cause and effect relationships.

3. Toxic Industrial Wastes Dumpsite, East of Cape Henlopen, Delaware.

This dumpsite is located 106 nautical miles southeast of Ambrose Light (at the entrance to New York Harbor) and approximately 90 nautical miles due east of Cape Henlopen, Delaware. The area is bounded by 38°40'N to 39°00'N and 72°00'W to 72°30'W. The site is off the continental shelf at depths ranging from 1550 meters in the northwest corner of the site to 2750 meters in the relatively flat southeast corner. The bottom, for the most part, is characterized by a rugged topography. A major topographic feature of the region, the Hudson Canyon, is to the north, northeast and east of the toxic waste dumpsite.

This site is used by over 30 different ocean dumpers in the New York - New Jersey area for the disposal of industrial chemicals.

In 1974, a total of 1,148 million gallons of wastes were disposed of in the site, of which 41 million gallons were in sludge (semi-viscous) form. All the remaining wastes were in liquid form. Wastes are dumped by barge just beneath the water's surface at a nominal speed of 5 knots. Typical waste materials are hydrochloric acid by-products, inert ore slurry from production of titanium dioxide pigments, residual sludge from galvanizing and plating operations, liquid wastes from textile manufacturing, liquid wastes from etching and photographic processes, water solutions of inorganic salts, and similar materials resulting from diverse manufacturing processes. Containerized radioactive wastes were dumped in a location just south of the present site several years ago and prior to enactment of the act.

In May, 1974, NOAA began a series of baseline surveys of this dumpsite in cooperation with EPA, the Virginia Institute of Marine Science, the Woods Hole Oceanographic Institution, and the Lamont-Doherty Geological Observatory of Columbia University, and the Smithsonian Institution.

Another cruise is planned for July, 1975, and the final baseline cruise is planned for February, 1976. The July cruise will make use of the manned submersible ALVIN, and attempts also will be made to collect data at the radioactive waste dumping area south of the dumpsite.

The hydrography of the dumpsite area is complex and the currents are seasonally variable. Any one of three water masses may be present at different times or at different levels in the water column: shelf, slope, and Gulf Stream water have all been identified. Circulation patterns are affected by mixing across frontal zones. Currents run predominantly southward along the coast, while the Gulf Stream runs generally northeastward. The slope water may circulate in a cyclonic gyre. Surface circulation is primarily a function of season.

In addition to hydrography, studies have also been made in the water column of the occurrence and, in some cases, relative abundance of nutrients, zooplankton, ichthyoplankton, and nekton.

The bottom of the dumpsite has also been investigated by means of echo-sounding, photography, trawling, and quantitative sampling in order to describe aspects of geology, geochemistry, and benthic fauna.

Investigations have been made of heavy metal and other contaminants in water, sediments, and in the tissues of larger benthic fishes and invertebrates.

4. Farallon Islands Radioactive Waste Dumping Site.

Low-level radioactive wastes were dumped in deep-ocean disposal sites off the coasts of California and Maryland - Delaware between the years 1946 and 1966. The gradual phasing out of this practice began in 1962 and was replaced by burial of the radioactive wastes on land. Currently there is no ocean dumping of radioactive wastes but many government agencies have expressed interest in resuming this waste disposal alternative.

With the passage of the Act, EPA was given responsibility for developing regulations controlling ocean dumping of wastes including radioactive wastes not specifically prohibited by statute. Dumping of high-level radioactive wastes and radiological warfare agents is specifically prohibited. The final regulations and criteria for ocean dumping, issued October 15, 1973, require that any radioactive materials to be dumped must be containerized and that the container and/or inert matrix retaining the waste must allow the material to radiodecay to innocuous levels before any release to the marine environment.

In order to expand on this requirement and to evaluate any permit requests, it is necessary to obtain information on past disposal operations to answer such questions as:

(1) Were past disposal practices adequate to prevent any environmental damage?

(2) Were techniques used in packaging the radioactive materials adequate to insure their retention?

(3) If dumping should commence in the future, is it technologically feasible to adequately survey or monitor a radioactive waste dumpsite to detect any potentially adverse effects?

To obtain preliminary answers to these questions EPA developed a pilot study to investigate a formerly used radioactive waste dumpsite located approximately forty miles west-southwest of San Francisco, California, near the Farallon Islands, and centered at coordinates 37° 39'N, 123° 08'W, at a water depth of 3,000 feet.

In order to accurately locate and sample within the dumpsite, and to photographically document the condition of the radioactive waste containers EPA selected an unmanned, tethered submersible, the CURV III (Cable-Controlled Underwater Recovery

Vehicle), for this study. The CURV III is operated by the Naval Undersea Center in San Diego, California, and has a depth capability of 10,000 feet.

The pilot study was conducted from August 23 through August 31, 1974, with the EPA Office of Radiation Programs supplying the chief scientist to coordinate the operation.

During the course of the study the operations team achieved the following:

(1) First location of an actual radioactive waste dumpsite with supporting documentation as to actual years of usage. (This is important in determining corrosion rates of the containers, number of containers dumped, and relative inventory of the dumped materials from which to assess any radionuclide dispersion.)

(2) First videotape and 35mm coverage documenting the conditions of the radioactive waste containers.

(3) First precision-located sediment samples in a radioactive waste disposal area. (This was achieved using a videotape monitoring system coupled with a specially-devised rosette coring device.)

(4) Examination of large sponges up to four feet high (possibly a new genus) attached to the radioactive waste containers; these may contribute to the biodeterioration of metal containers at the 3,000-foot depth.

(5) Documentation of edible species of fish in the immediate vicinity of the containerized radioactive wastes, supporting potential foodchain transfer.

EPA obtained much preliminary information on container integrity and design. Through existing records and correspondence pertaining to past disposal operations in the region of the Farallon Islands, it was possible to determine the age of the photographed containers as between 20-22 years old. Those radioactive wastes packaged in an inner matrix of concrete have maintained relatively good integrity while those packaged in a gel matrix with a tar liner did not retain the wastes as well. Radionuclide analyses for strontium, cesium, uranium, thorium, radium, plutonium, and gross gamma activity are currently being completed, and an operations report on the Farallon Islands pilot study is soon to be published. Preliminary results of radiochemical analyses of sediment samples have detected some levels of plutonium above

background in the dumpsite. The implications of the findings are under investigation and the results will be included in a forthcoming technical report.

5. Proposed Industrial Waste Dumpsite in the Eastern Gulf of Mexico

During the summer of 1974, consideration was being given to the disposal of wastes from the E.I. du Pont de Nemours plant at Belle, West Virginia, at a site in the eastern Gulf of Mexico. As part of its permit application DuPont conducted, by contract, a baseline survey of the proposed dumpsite and continental shelf areas to the north and east. The permit was ultimately denied and the site has never been used. The results of this baseline survey, however, offer an analysis of environmental conditions in tropical open ocean areas.

The area chosen for this dumpsite is 170 nautical miles southeast of the Mississippi River and 230 nautical miles due south of Pensacola, Florida. It is in the deepest part of the Gulf of Mexico (about 3,000 meters) and is about 100 nautical miles from the continental shelf to the north and east of the dump site.

Physical, chemical, and biological investigations were conducted for E.I. du Pont de Nemours in the Gulf of Mexico in June, 1974. These investigations were designed by DuPont and the Environmental Protection Agency to provide baseline data at a proposed disposal site and at continental shelf stations. Five stations in the eastern midgulf (about 27°N, 87°W) were investigated between June 2-4, 1974; seven stations along the continental shelf (from east of Tampa, Florida, to south of New Orleans, Louisiana) were investigated between June 7-13, 1974.

Current velocities in the midgulf were approximately one knot to the southeast, consistent with the range of current values reported by the U.S. Naval Oceanographic Office (1972) for the general April - June period. Dissolved oxygen levels in the midgulf were close to the levels found in surface seawater where biological activity is not excessive. Ambient light transmission levels showed 1 percent transmission to as deep as 100 meters. All of the chemical analyses of seawater from the midgulf produced results at or below levels for general ocean water with most variables below their detection limits. Plankton levels of the midgulf had a mean of 325 individuals per liter. This number, while low in comparison to inshore waters, is in agreement with historical data for the mid-Gulf of Mexico.

Current velocities at shelf stations were in general agreement with historical data. Dissolved oxygen levels at shelf stations were generally close to the quantity found in surface seawater when biological activity is not excessive. Chemical analysis results of seawater from the shelf stations were approximately the same as had been measured in the midgulf. In addition to some trace organics, only mercury and antimony concentrations were higher than levels for general ocean water. Sediment analyses for shelf stations showed barium and cadmium concentrations higher than USGS reported levels. Four pesticides and some aromatic hydrocarbons were found in the sediment; concentrations of these materials were only slightly above minimum detectable concentrations. Grain sizes of shelf sediment agreed with historical data. Chemical analyses of plankton showed heavy metal concentrations generally lower than historical data. Zooplankton counts, to some extent, paralleled the phytoplankton counts. No species of zooplankton or benthos was conspicuous by either presence or absence. In general, results were in agreement with available historical data in all aspects of this investigation.

V. EPA RESEARCH PROGRAMS

No sharp line can be drawn between permit operations, baseline surveys, and research within the overall EPA approach toward implementation of the ocean dumping permit program. Technical assistance for permit operations is provided in specialized areas by the EPA Office of Research and Development. Much information of value to EPA's research efforts is collected in permit operations and monitoring and baseline survey activities conducted by EPA Regions and the Office of Water and Hazardous Materials which is responsible for coordinating the national ocean dumping permit program.

The EPA Office of Research and Development has been concerned with marine pollution problems for many years. The projects supported under this program have been historically oriented toward estuarine pollution problems and those related to ocean outfall disposal. With the passage of the Ocean Dumping Act in 1972, some of these activities were reoriented to provide a sharper focus on problems related specifically to ocean dumping, while research directed toward solving other marine pollution problems was strengthened.

Research efforts related to the ocean dumping permit program within EPA have been focused in three areas since the inception of the program in 1973. These are: (1) criteria development, (2) methods development, and (3) environmental impact assessment. Highest initial priority has been given to the development and improvement of criteria and analytical methodology, and as these efforts have brought positive results, additional resources have been devoted to research directed toward the assessment of environmental impact.

Of particular concern has been the development of acute and chronic toxicity levels for mercury and cadmium in ocean waters and the application of these values to the ocean disposal criteria. As a result of contract studies with the National Academy of Sciences directed toward the revision of water quality criteria, in addition to recent results of in-house EPA research efforts, information is now available which provides a basis for consideration of modification of the published criteria for mercury and cadmium; revised criteria for these constituents may be proposed in the near future.

Initial efforts on analytical methodology have resulted in the development of an "interim" Ocean Dumping Analytical Methods Manual which is currently in use by EPA Regions and permit applicants. As part of this effort a manual of standard bioassay

techniques has been compiled and revised as the state of knowledge has advanced. During the coming year the bioassay techniques will be revised to incorporate more sophisticated methods of detecting chronic effects of pollutants on marine organisms.

The environmental impact of ocean dumping is being studied directly by in-house EPA activities as well as through grants and contracts. These efforts are being concentrated in three general areas: trace metal impacts, impacts of persistent organic compounds such as pesticides, and modeling techniques to predict impacts.

The following studies are being conducted on the movement and impact of trace metals in marine waters. While many of these studies deal primarily with estuarine situations, the results can, in most cases, be extrapolated to ocean dumping situations.

1. An industrial waste dump site and a sewage sludge dump site are being used to test the concept of analytically "fingerprinting" a waste material by trace metal analysis. Research efforts have attempted to follow the fate of each waste by following particular metal "tags". Results to date indicate an increase in trace metals in benthic invertebrates at and around the dump sites. Future efforts will extend the sampling areas in an effort to delineate the total area of effect of the dumping activities.

2. At a dredged material disposal site in Rhode Island Sound, where material containing high concentrations of heavy metals has been deposited, a clear demonstration of deleterious ecological impact is developing. Preliminary data indicate high cadmium and zinc concentrations in the water directly over the dredged material deposit. Histological examinations of tissues from the clam Arctica islandica have revealed kidney damaging concretions in clams found as far as five miles from the site. Tissue damage was greater in clams found closer to the site. Concentrations of selected metals in clam tissues have been shown to be very high relative to uncontaminated controls. Crabs caught on the dredged material showed abnormally eroded and discolored carapaces.

3. An extensive field sampling program to evaluate the effects of metals on benthic animals has been conducted in lower Narragansett Bay, R.I. This study was designed to develop techniques for evaluating the ecological impact of a typical industrial discharge containing large quantities of heavy metals. Metal contamination of benthos has been demonstrated.

4. A study of the movement of trace materials from sewage sludge into marine biota is being performed. While prime emphasis is on metal transport and uptake, consideration is also being given to investigations of the ecological behavior of chlorinated hydrocarbons.

5. A study entitled "Dredge Spoils and Sewage Sludge in the Trace Metal Budget of Estuarine and Coastal Waters" will develop field methods for assessing metal fluxes from natural sediments. The study will attempt to develop correlations between water column metal levels and sediment metal concentrations in the Hudson River estuary and the New York Bight.

6. A mathematical model to assess the effects of time dependent and time independent sewage sludge stress on marine plankton systems is under development.

7. A grant entitled "Influence of Dredged Spoils and Sediment Pollution on Trace Metal Assimilation by Organisms" will use controlled laboratory experiments simulating ocean dump sites to assess metal fluxes between sediments and overlying water.

8. A grant to assess contaminant impacts in a historical context will use various radioisotope determinations to date sediment layers in core samples taken from strategic locations along the East Coast. It is hoped that contaminant concentrations will correlate with the age of each layer to provide an estimate of historical trends of pollution on the Atlantic shelf.

9. A grant entitled "Transport, Fate and Geochemical Interaction of Mercury, Cadmium and Inorganic Pollutants in the Coastal Littoral and Salt Marsh Environment of the Southeastern United States" is attempting to describe the behavior of discharged heavy metals.

10. A grant entitled "Chemistry of Mercury in Natural Waters" is tracing the pathways of mercury in the marine environment. Particular emphasis is being made on the fate and mobility of mercury in sediments, surface waters, pore water and biota in the estuaries of the Gulf Coast region.

The impact of persistent organic compounds, particularly pesticides and halogenated hydrocarbons, is a matter of major research interest to EPA. In-house research efforts are directed toward determining the ecosystem perturbations resulting from the presence of environmental levels of these materials and developing bioassay techniques to assess such impacts on a routine basis.

In addition to the in-house efforts, the following grant or contract studies are underway:

1. "A Synoptic Survey of Chlorinated Hydrocarbon Inputs to the Southern California Bight" is providing information on the rates at which chlorinated hydrocarbons enter the coastal waters of the Southern California Bight. Sources of chlorinated hydrocarbons, such as land runoff, wastewater effluent, direct industrial discharge, vessel anti-fouling paint, aerial fallout, and ocean current advection are being investigated. The effects of ocean outfalls on the structure and incidence of disease in biotic assemblages are also being studied.

2. A grant entitled "Accumulation of Persistent Organic Compounds in Phytoplankton and Influence on Phytoplankton Growth" is being performed in the Puget Sound region.

On a broader scale, EPA research is directed toward the application of mathematical modeling techniques to predict the fate of pollutants in the marine environment and to assess their effects on marine ecosystems.

1. An in-house study of ocean dumping impact in the New York Bight will provide information essential to proper management of ocean disposal sites. The purpose of the project is to develop a predictive capability to describe the fate of sewage sludge discharged from moving barges into a near-shore ocean environment. Mathematical models have been devised to predict the time-spatial distribution of sewage sludge originating from barge disposal. Work is being performed to field-verify this model. A biological baseline of the natural condition of benthic communities in the New York Bight has been established for comparative study of existing and future environmental alterations due to ocean disposal.

2. Another in-house study is developing biological assessment techniques to determine the "health" of marine ecosystems using biological indices. This approach can be used to assess the impact of stresses such as ocean dumping and outfall discharges upon community structure and population dynamics of locally residing biota in polluted and non-polluted marine environments.

3. A numerical hydrodynamic model study for the pollutant flushing in Prudhoe Bay, Alaska is being carried out in-house. A limited field investigation will be undertaken during the ice-free season this summer.

4. The usefulness of currently available analytical techniques for objective and quantitative evaluation of species, populations,

and community responses to environmental changes will be the focus of a grant entitled "Quantitative Response Characteristics of Coastal Fish and Benthic Invertebrate Communities."

5. A study entitled "Biological Analysis of Primary Productivity and Related Processes in New York Harbor as Reflective of Changing Water Quality" is investigating those processes and factors which might contribute to massive algal blooms. This study will provide information relevant to the kinds of treatment required for municipal waste discharges. In addition, the study will investigate whether the water quality of the New York harbor region is being affected by materials flowing into the area from offshore sludge dumping sites.

6. A grant entitled "Fate of Pollutants Discharged from Coastal Outfalls" is investigating the chemical factors affecting the fate of pollutants. This will include field and laboratory studies.

7. A grant entitled "Retention of Pollutants in Fjords" is in its third year. Here, mathematical models of circulation, nutrient transport and phytoplankton dynamics have been simulated and compared with historical data in Puget Sound. Present plans call for further study of the deep circulation below the sill depth and further biological work.

8. As part of a grant entitled "Biological Control of Microbial Pollutants in Natural Waters," a mathematical model of the die-off of bacteria released from ocean outfalls has been developed.

VI. DREDGED MATERIAL DISPOSAL

Under the authority of Section 103 of the Act, dredged material may be dumped under permits granted by the U. S. Army Corps of Engineers after the proposed permit has been re iewed and agreed upon by EPA. In issuing such permits the Corps is required to use EPA-designated sites wherever feasible, but the Corps may use other sites if:

1) they determine that disposal at the EPA sites is not economically feasible, and

2) EPA makes the determination that such disposal will not have an unacceptable adverse effect on the environment.

Each EPA Regional Office is provided copies of Public Notice of the Corps' intent to issue a permit for dredging and disposal of dredged material. Each notice is reviewed for its compliance with the EPA criteria for disposal in the ocean. During 1974, about 110 such notices were reviewed. Region I (Boston) reviewed 20, Region II (New York) 50, Region III (Philadelphia) 1, Region IV (Atlanta) 20, and Region IX (San Francisco) 19. Ocean disposal of dredged materials in Regions VI and X (Dallas and Seattle) is done by the Corps.

Table 8 shows the volume of dredged material dumped during CY '74. This shows a volume more than twice that dumped during 1973. Most of the increase occurred in the Lower Mississippi Valley (the New Orleans District of the Corps of Engineers). This increase is caused by the additional dredging of the Mississippi River required from the results of flooding in the lower Mississippi Valley over the past two years. This volume may be expected to be at a similar or perhaps greater level next year. Additional increases may be expected during the next few years in several Districts resulting from the dredging required to deepen channels to the home bases for the U. S. Navy's new submarines.

The River and Harbor Act of 1970 (P. L. 91-611) authorized the Chief of Engineers, under the direction of the Secretary of the Army, to conduct a comprehensive program of research, study, and experimentation relating to dredged material. In May 1971 the U. S. Army Engineer Waterways Experiment Station at Vicksburg, Mississippi, was assigned the task of defining and assessing the problem and developing a research program.

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TABLE 8

DREDGED MATERIAL DUMPED IN OCEAN - 1974

	Corps of Engrs. (Cu. Yds.)	Permits (Cu. Yds.)	Total (Cu. Yds.)
New England Division	1,340,400	921,800	2,262,200
North Atlantic Division	8,234,543	3,475,849	11,710,392
South Atlantic Division	2,931,748	2,979,500	5,911,248
Lower Mississippi Valley Division	54,600,000	-	54,600,000
Southwestern Division	9,743,982	-	9,743,982
South Pacific Division	7,162,918	1,292,500	8,455,418
North Pacific Division	5,982,280	-	5,982,280
	89,995,871	8,669,649	98,665,520

A five-year Dredged Material Research Program was conceived with the objective of providing through research definitive information on the environmental impact of dredging and dredged material disposal operations and to develop technically satisfactory, environmentally safe, and economically feasible dredging and disposal alternatives, including consideration of dredged material as a natural resource. Execution of the program was assigned to the Waterways Experiment Station and research was initiated in March 1973. The Corps estimates the total cost of this research program at $30 million.

The Dredged Material Research Program is divided into 4 projects, each directed by a full-time project manager and each with its own project staff:

- Aquatic Disposal Research Project
- Habitat Development Research Project
- Disposal Operations Research Project
- Productive Uses Research Project

Although all of the above projects have a bearing on ocean disposal of dredged material, the Aquatic Disposal Research Project is perhaps the most significant. The objective of this project is to determine the magnitude and extent of effects of aquatic disposal on organisms and the quality of surrounding water, and the rate, diversity, and extent disposal sites are recolonized by benthic organisms.

The Dredged Material Research Program consists of 150 work units and by the end of 1974, the program was about 40 percent completed. The Corps anticipates completing the program by FY '78, as originally planned.

Some of the more significant findings of the program to date have been:

o The historical dumping in the Pacific Ocean site off the mouth of the Columbia River does not appear to have had a chemical or water quality impact on the surrounding area. The bottom dwelling biota in the Pacific Ocean site appear to be enriched due to the accumulation of finer grained sediments on the bottom. The physical impact of dumping at the Pacific Ocean site appears minimal.

- Historical disposal (75 years) at Eatons Neck (Long Island Sound) gives no indications of detrimental water quality and biological impact on Long Island Sound. The fishing is excellent in the area and bottom biota representative of central Long Island Sound. The physical impact of the historical dumping in Long Island Sound (13,000,000 cu. yds.) has resulted in piles or mounds on the bottom. These mounds, in turn, are reported to have enhanced lobster habitats.

- Turbidity increases during disposal at a site off Galveston, Texas, could not be detected over background levels due to storm-induced natural turbidity.

- Toxic heavy metals and organic pesticides do not appear to be released and are apparently very stable in sediments.

- Aerobic conditions in disposal site water retard the release of some nutrients and most toxic heavy metals. Anoxic conditions in disposal site water enhance the release of some nutrients and only a few toxic heavy metals.

- Most chemicals do not appear to be released from underwater dredged material deposits at greater rates than those released from natural sediments. Ammonia and manganese are released to overlying water but are rapidly lost to the aquatic system.

Calendar Year 1975 represents the approximate apex of the scheduled scope and funding of the Dredged Material Research Program. Work will be underway by the end of the year in all program tasks.

In conjunction with the Corps of Engineers, EPA plans to hold a workshop on dredged material disposal in Fiscal Year 1976. This workshop will concentrate on dredged material disposal criteria, application and utilization of the elutriate tests in operational modes, standardized procedures, and if needed, recommended revisions to the tests.

VII. OCEAN INCINERATION: A NEW TECHNIQUE IN OCEAN DISPOSAL

Under the ocean dumping program, if there are viable, feasible alternatives to the direct disposal of the material into the marine environment, either by incineration or any other way, then those methods should prevail. Ocean incineration is one of these alternatives. Chemical wastes are taken aboard specially designed and equipped vessels and transported to specified locations in the ocean. There, onboard incinerators are fuel fired to a predetermined temperature, the waste valves are opened, and waste is fed into the incinerator. The nature of the wastes being incinerated is such that once they hit this pre-heated incinerator they continue to burn and the fuel feed is cut off. Efficiencies of these incinerations are greater than 99.9 percent complete combustion.

Ocean incineration has been conducted routinely for two years in the North Sea for industries in the Netherlands, Scandinavia and Great Britain. Presently, three such vessels are in operation with a fourth, a much larger one, under construction.

On September 27, 1974, EPA determined that ocean incineration of wastes is under the purview of the Act. On October 10, 1974, a research permit was issued for incineration at sea of 4,200 metric tons (MT) of organochlorine wastes from Shell Chemical Company's Deer Park, Texas, plant. The wastes were a mixture of low molecular weight chlorinated hydrocarbons consisting primarily of trichloropropane, trichloroethane, and dichloroethane. These wastes originated from the plant's production of glycerin, vinyl chloride, epichlorohydrin, and epoxy resins.

The incineration took place during October 20-28, 1974, in the Gulf of Mexico at a new dumping site approximately 130 nautical miles from the nearest land. The wastes were incinerated aboard the M/T Vulcanus, which is owned by Ocean Combustion Services, B.V., of the Netherlands. The two high-temperature incinerators aboard the Vulcanus are designed to burn upwards of 99.9 percent of organochlorine wastes. The resulting emissions consisted primarily of hydrogen chloride, carbon dioxide, and water; they were discharged directly into the atmosphere without scrubbing.

In accordance with conditions of the permit, a substantial monitoring effort was undertaken to determine the feasibility of this waste disposal technique and the impact of the emissions on the marine environment. A large amount of data was gathered during the incineration. Following review of the results, EPA concluded that, although there were some shortcomings in the

the monitoring efforts, conditions and criteria of the initial research permit had been met. No significant adverse impact on the environment was noted from the monitoring study. On November 27, 1974, EPA granted a second research permit to incinerate another shipload (4,200 MT) under essentially the same conditions as for the first shipload. Some monitoring requirements were modified to correct some gaps in the information gathered on the first incineration.

The second research burn took place December 2-9, 1974. On December 10 EPA scientists and representatives of Alabama, Florida, Louisiana, and Texas met and unanimously concluded that incineration by the Vulcanus of Shell's remaining organochlorine wastes, under the same conditions imposed by the two research permits, was an environmentally compatible means of disposing of the wastes. On December 12, EPA issued an interim permit for incineration of the remaining 8,400 MT. The wastes were incinerated in two loads, on December 19-26, 1974, and on December 31, 1974, through January 7, 1975.

The final report on this incineration will be published in the near future.

The U. S. Air Force has applied for an ocean dumping permit for the ocean incineration of its stocks of Herbicide Orange. They have also requested EPA to assist them in exploring the feasibility of reformulation or reprocessing.

As a preliminary step in the evaluation of their permit application, a public meeting was held in Washington on February 19, 1975, to receive public comment on the Air Force proposal. The meeting was attended by about 60 people, including representatives of several environmental interest groups. The general public reaction to the proposal to incinerate Herbicide Orange at sea was favorable, provided adequate monitoring of the incineration was done and that conditions of practically complete combustion were maintained. While reprocessing or reformulation were recognized as potentially feasible alternatives, concern was expressed about the potential for environmental damage during continued storage and transportation to a reprocessing site.

On March 24, 1975, notice was published in the Federal Register of the receipt of the application, the tentative determination to grant the Air Force a research permit allowing the incineration of 4,200 metric tons or less, and the proposed designation of a site for the burn.

Public hearings were held on this permit application in Honolulu on April 25, 1975, and in San Francisco on April 28, 1975. At these hearings the Air Force presented extensive testimony indicating that the proposed ocean incineration would do no harm to the marine environment or cause any effects in the air. They also indicated an intent to investigate reprocessing proposals by conducting pilot plant studies on a small amount of the Herbicide Orange to see whether the claims made by the reprocessing firms were valid. They requested a reconvening of the hearing in Washington at a later date after the pilot plant studies were completed.

Other comments were also made at the hearings regarding the potential for environmental impact of the incinerator emissions, and full consideration will be given to all comments before a final decision regarding the ultimate disposal of Herbicide Orange is reached.

VIII. PUBLIC PARTICIPATION IN THE PROGRAM

Section 222.5 of the Ocean Dumping Final Regulations and Criteria provides that any person may request in writing a public hearing to consider the issuance or denial of any ocean dumping permit application following public notice of receipt of such application.

During 1974, 12 public hearings were held - one by Region I, three by Region II (one each on municipal and industrial permit applications on the mainland, and one in Puerto Rico), three by Region III, three by Region VI, and two by Headquarters.

Hearing attendance averaged 135 at the Region II hearings, 70 at the Region III hearings, and 55 at the Region VI hearings. In addition to representatives of EPA and the applicants, other Federal agencies, Federal, state and local officials, environmental groups, academia, concerned citizens and the news media attended these hearings. Those who wished to make statements on the proposed dumping did so. Television and newspaper coverage of the hearings was often extensive, and public participation was spirited. Many citizens expressed concern regarding the possible degradation of the oceans and, in Region II, fear that sewage sludge from the New York Bight was moving toward the beaches of Long Island.

A three-day public hearing was conducted by EPA Headquarters in Pensacola, Florida, in July 1974, on an application from DuPont-Belle, West Virginia, to dump chemical wastes in the Gulf of Mexico. This hearing was attended by approximately 250 persons. Extensive scientific testimony was presented on behalf of the applicant, and by representatives of the Gulf states who opposed the proposed dump. As a result of this hearing, the Administrator of EPA determined in October to deny the permit until further technical studies could clarify the environmental concerns regarding the ecological impact of the dumping operation.

Headquarters also conducted a public hearing on the application of Shell Chemical Company to incinerate organochlorine wastes at sea. Following the hearing, a research permit was issued to Shell to incinerate 4,200 metric tons of this waste on a specially designed incinerator ship. A technical conference was held after this first burn to evaluate the results of extensive monitoring conducted during the burn. Even though no adverse effects to the marine environment were observed, a second research permit was issued to allow aerial monitoring of the

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emissions from the incinerator stacks and additional sea-surface monitoring. Based on the results of the second research permit, Shell was granted an interim permit to dispose of two more shiploads of these wastes.

In its implementation of the ocean dumping permit program, EPA has been impressed by the nature and extent of public concern for the oceans and interest in how the program is progressing. In comments received at public hearings, in letters received in response to public notices, and in reaction to newspaper reports, it is apparent that the public is deeply concerned about pollution of the oceans and what is being done about it.

IX. THE FUTURE OF OCEAN DUMPING AS A MEANS OF DISPOSAL

The enactment of the Marine Protection, Research, and Sanctuaries Act of 1972 reflected the public awareness of a need to assess and control the cumulative effects of man's activities on coastal and ocean resources, and the undesirable and possibly irretrievable changes to ocean ecosystems that these activities may have.

Prior to passage of the Act, regulatory activities and authorities were scattered among different agencies and were not adequate to handle the problems of ocean dumping. States did not exercise control over ocean dumping and generally their authority extended only within the three-mile territorial sea. The Army Corps of Engineers' authority to regulate ocean dumping was also largely confined to the territorial sea, but the Corps dredging activities, in response to its responsibility to facilitate navigation, involved it with ocean disposal beyond the three-mile limit. The Coast Guard enforced several Federal laws regarding pollution but did not have direct authority to regulate ocean dumping. The Atomic Energy Commission (now the Nuclear Regulatory Commission) licensed the disposal of radioactive materials.

In enacting the Ocean Dumping Act, the Congress vested the responsibility for regulating the dumping of all materials except dredged material in the Environmental Protection Agency; regulating the ocean dumping of dredged material was assigned to the Corps of Engineers using criteria promulgated by EPA in consultation with the Corps. Because protection of the marine environment was of immediate concern, the Act required that criteria be developed and the regulatory program implemented based on the then known impact of waste materials in the oceans. At that time, however, there was a great dearth of knowledge on the impact of wastes on the marine environment. This is being rectified as rapidly as possible at the same time the permit program is in operation, but EPA's efforts to meet its responsibilities under the Act were undertaken with the realization that modifications of various aspects of our programs would be required in the future.

In its first two years of regulatory authority over ocean dumping, EPA has taken a strict, highly restrictive approach toward applying the criteria embodied in the Act by requiring all dumpers to actively seek alternatives to ocean dumping even when their wastes have met the published EPA criteria for issuing permits. During these two years EPA has brought all ocean dumping in the United States under full regulatory control and has required many dumpers either

to stop dumping immediately or to phase out their dumping activities within the next few years.

EPA has taken this approach because of the general lack of specific knowledge about the impacts of waste materials on marine ecosystems. As the results of research now underway become available, it may be possible to become more selective in permitting the disposal of some wastes by ocean dumping if it can be demonstrated that the disposal will not cause unreasonable degradation of the marine environment.

The general problem of pollution of the marine environment has numerous components, of which pollution by ocean dumping is only one. Other significant sources of pollution are ocean outfalls, discharges from offshore platforms, and land runoff from rivers and estuaries. Most forms of pollution from these sources are regulated under the Federal Water Pollution Control Act Amendments of 1972 through the National Pollutant Discharge Elimination System, and specifically Section 403(c) which requires the setting of ocean discharge criteria for ocean outfalls. EPA applies the same strict criteria to outfall disposal as it does to ocean dumping, in addition to requiring at least secondary treatment for all municipal sewage.

In looking to the future, it can be expected that increase in population and industrial growth in coastal areas, which historically tend to grow more rapidly than inland areas, will result in greater pressures for ocean disposal either by outfall or by dumping, in addition to much larger quantities of effluents being discharged in rivers and estuaries. All these sources of pollution of the marine environment must be regulated and strictly controlled to limit adverse impacts and to insure that the best environmental alternatives are chosen.